Ex Is the electric rocket of the previous example optimized for $\Delta u_b = 3.2$ km/s ?

This can be determined by finding the I_{sp} for $\left(\frac{M_L}{M_{01}}\right)_{max}$ at Δu_b of 3.2 km/s with the specified α, η and t_b.

$$\boxed{\frac{M_L}{M_0} = e^{-\frac{\Delta u_b}{u_e}}\left(1 + \frac{\alpha u_e^2}{2\eta t_b}\right) - \frac{\alpha u_e^2}{2\eta t_b}}$$

$\alpha = 10 \frac{kg}{kW} = 10(10^{-3}) \frac{kg}{W}$, $\eta = 0.5$, $\Delta u_b = 3200$ m/s

$t_b = 4$ weeks $= 2.4192(10^6)$ s

I_{sp} (s)	1600	1500	1400	1300	1200
u_e (m/s)	15696	14715	13734	12753	11772
$\frac{M_L}{M_0}$	0.6277	0.6296	0.6301	0.6289	0.6256

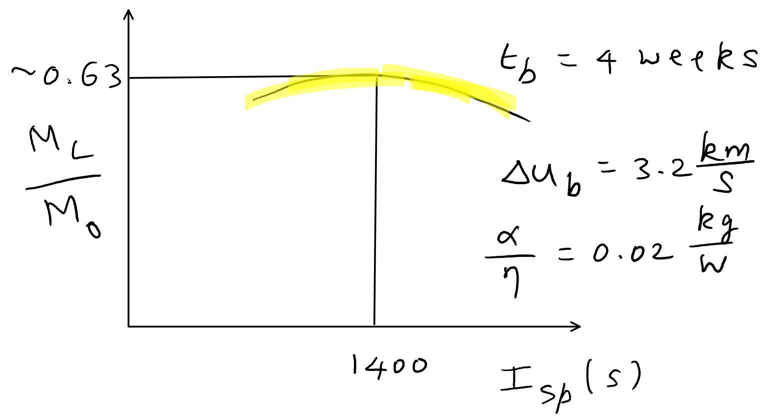
$I_{sp} g_e$

The optimum $I_{sp} = 1400\ s$. This would result in

$$\frac{M_L}{M_0} = 0.6301$$

The earlier problem used I_{sp} of $2000 s$, for which

$$\frac{M_L}{M_0} = 0.61$$



$$\frac{d(M_L/M_0)}{du_e} = 0$$